APPENDIX I

PRELIMINARY RISK ASSESSMENT

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Memorandum

Date: 2 July 2003

To: Chemical, Biological and Radiological (CBR) Proficiency Area, Parcel 517(7), Fort McClellan, Calhoun County, Alabama
Preliminary Risk Assessment File

From: Paul F. Goetchius, DVM
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RE: **PRELIMINARY RISK ASSESSMENT FOR SUBJECT SITE: REVISION 1**

This memorandum provides a Preliminary Risk Assessment (PRA) for the Chemical, Biological and Radiological (CBR) Proficiency Area, Parcel 517(7), herein referred to as Parcel 517(7). The purpose of the PRA is to support a recommendation for no further action and unrestricted site use with regard to CERCLA-related hazardous substances. The PRA approach is a shortened version of the Streamlined Risk Assessment (SRA) protocol developed as a uniform and economical approach to evaluating hundreds of similar sites at Fort McClellan (FTMC). It is assumed that the reader is familiar with FTMC and the fundamentals of the SRA protocol. The reader is referred to the Installation-Wide Work Plan (IT, 2002) for more detail. All the comparison and computational operations of the PRA are performed within EXCEL® spread sheet tables.

Media of Interest and Data Selection Media of interest on Parcel 517(7) include surface and depositional soil, subsurface soil and groundwater. Surface water is not consistently present on the site, and significant contact with this medium is unlikely. Therefore, surface water is not included in the PRA. Data consist of four samples of surface soil, subsurface soil and groundwater – each sample taken from a separate location at which a groundwater monitoring well was installed and developed. Surface soil samples were taken from 0 to 1 feet below ground surface (ft bgs), subsurface soil samples were taken from 2 to 8 ft bgs. The depth of the screening of the monitoring wells was not available for this evaluation. Three depositional soil samples collected from 0 to 0.5 ft bgs were included in the surface soil data set, resulting in a total of 7 surface soil samples. All soil and groundwater samples were analyzed for metals, semivolatile organic compounds (SVOC), volatile organic compounds (VOC), and chemical warfare material (CWM) degradation products. All the analytical data were third-party validated. Analytical data for organic chemicals that were "B" qualified, indicating that one or more blanks were contaminated, were not used in the PRA. This caused rejection of one detection of methylene chloride and two detections of acetone in surface soil, and one detection of methylene chloride in groundwater from the PRA. All "B" qualified data dropped from the PRA, however, were well below their residential SSSLs; therefore, deleting these data had no effect on the outcome of this evaluation.

An additional exposure medium – total soil – was created by combining the surface and subsurface soil data sets. This was done to accommodate the probability that future site development for any reason might involve excavation and grading, in which case receptors would be exposed to neither surface nor subsurface soil alone, but to a mixture or imperfect blend of the two. This is a conservative approach that considers the possibility for exposure to the highest chemical concentrations in both surface and subsurface soil.

Site-Related Chemical Selection Site-related chemicals are those presumed to be released by the army during operation of FTMC. Site-related metals were selected by a three-tier process as described in a technical memorandum (Shaw E&I, 2003) on background screening. Briefly, the procedure consists of: (Tier 1) comparing the maximum detected concentration (MDC) of each chemical with its background screening criterion (BSC), computed as two times the mean of the background data set, consistent with EPA (2002a) Region IV guidance; (Tier 2) one or more statistical tests, depending on the characteristics of the background and site data sets; and (Tier 3), geochemical evaluation. The selection of site-related metals is discussed briefly in Section 5.4 and included as Appendix H.

Several polynuclear aromatic hydrocarbons (PAH) were detected in soil. PAHs, however, are somewhat ubiquitous as a result of incomplete combustion of fossil fuels unrelated to site-specific activities. Therefore, PAH concentrations in site soil were compared with "anthropogenic background" BSCs for soil adjacent to asphalt as described by IT (2000). All other organic chemicals were selected as site-related because they seldom are naturally occurring or reflect non-site-specific anthropogenic activity. Site-related chemicals were subjected to chemical of potential concern (COPC) selection (described below) for inclusion in the PRA. Results of the site-related selection process are described below.

Receptor Scenario Selection The Site Investigation Summary states that Parcel 517(7) will be used for education/training. The information is insufficient to establish exposure parameters for those who are to be educated or trained. Also, it is likely that educators or trainers would spend more time than the students on the facility and would be more highly exposed. Furthermore, the most highly exposed would probably be maintenance personnel or caretakers. Therefore, the groundskeeper is selected as the most highly exposed individual under the education/training site-use scenario. The groundskeeper is assumed to be exposed to surface soil if further development of the site is not required, and also to total soil assuming that development is required to make the site suitable for the proposed site use. A construction worker is included as a plausible receptor for short-term exposure, because construction activity is likely to be required for development of Parcel 517(7) for any kind of useful application. Construction would probably include excavation; therefore, the construction worker is assumed to be exposed to total soil rather than only surface soil. An on-site resident is also included, although development for residential use is unlikely, to provide additional perspective. Also, sites that "pass" a residential risk evaluation generally can be released for unrestricted use with no further action. The resident is evaluated for exposure to surface soil, and a second time for exposure to total soil, assuming that construction (including excavation) is required to render the site fit for residential use.

Groundwater is evaluated as if it were developed as a source of potable water. It is assumed that all receptors mentioned above would be exposed to groundwater.

SSSLs for all three receptor scenarios were used to select COPCs for the media mentioned above.

Chemical of Potential Concern Selection COPCs are site-related chemicals whose MDCs exceed their SSSLs, and which may contribute significantly to risk. The SSSLs are receptor-, medium-, and chemical-specific risk-based concentrations that capture all the exposure assumptions and toxicity assessment of a full-blown baseline risk assessment. COPCs were selected for both cancer risk and noncancer effects when the data were sufficient.

Surface Soil. Chemicals detected in surface soil include several metals, low levels of four VOCs, several PAHs, one phthalate and thiodiglycol (Table 1). All the metals were shown to be present at concentrations comparable to background. Several PAHs also were shown to be present at background concentrations (Table 2). None of the site-related chemicals in surface soil were selected as COPCs for the groundskeeper because all chemical MDCs fell below their respective SSSLs (Table 1). COPCs in surface soil for residential exposure are limited to three PAHs (Table 3).

Total Soil. Chemicals detected in total soil (Table 4) are the same as those detected in surface soil (Table 1), indicating that additional chemicals were not identified in subsurface soil. All the metals were shown to be present at concentrations comparable to background. Several PAHs also were shown to be present at background concentrations (Table 5). None of the site-related chemicals in total soil were selected as COPCs for the groundskeeper (Table 4) or the construction worker (Table 6) because all chemical MDCs fell below their respective SSSLs. COPCs in total soil for residential exposure are limited to the same three PAHs that were selected as COPCs for surface soil (Table 7).

Groundwater. Chemicals detected in groundwater are limited to metals and two VOCs (Table 8). All the metals were shown to be present at concentrations comparable to background. Acetone was selected as the only COPC for groundskeeper (Table 8), construction worker (Table 9) or residential exposure (Table 10). No chemical concentrations in groundwater exceeded their respective EPA (2002b) maximum contaminant levels (MCL).

Risk Characterization Risk characterization combines the exposure assumptions and toxicity assessment (incorporated in the SSSLs) with the exposure-point concentration (EPC) to quantify the incremental lifetime cancer risk (ILCR) and noncancer hazard index (HI). ILCR and HI estimates are computed for each COPC in each medium, and are summed across COPCs and media to yield a total ILCR and total HI for each receptor scenario. The PRA differs from an SRA in that ordinarily no attempt is made to estimate an EPC that reflects a conservative estimate of average concentration for use in risk assessment. Instead, the MDC is adopted as the EPC, which imparts a conservative bias to the assessment.

EPA (1990) considers ILCR estimates below 1E-6 to be negligible, ILCR estimates from 1E-6 to 1E-4 to fall within a risk management range, and ILCR estimates above 1E-4 to be generally unacceptable. EPA (1989) considers HI values that do not exceed the threshold level of 1 to indicate that the occurrence of adverse noncancer health effects is unlikely. Summing HI values across chemicals, however, is considered to impart a conservative bias to the assessment,

because only those chemicals that share a mechanism of toxicity are likely to interact in an additive manner. Since data regarding mechanism of toxicity are generally insufficient, target organ or critical effect is used as a surrogate. In other words, chemicals that act upon the same target organ or that have the same critical effect are considered to act by the same mechanism of toxicity. Therefore, when HI values summed across chemicals and media exceed the threshold level of 1, the HI values may be re-summed by target organ to refine the assessment.

Risk estimates may be rounded to one significant figure to reflect the uncertainty about their computation (EPA, 1989, 2002a). For example, a calculated ILCR of 9.50E-7 would be rounded to 1E-6 and interpreted as falling within the risk management range. Similarly, a calculated ILCR of 1.49E-4 would be rounded to 1E-4 and interpreted as falling within, but not exceeding, the risk management range. Also, an HI of 1.49E+0 would be rounded to 1 and interpreted as not exceeding the threshold level of 1. Risk estimates in this document are presented in scientific notation with two places to the right of the decimal to facilitate checking calculations. Rounding is done only if needed to simplify interpretation.

Groundskeeper. The groundskeeper was evaluated for exposure to surface soil (Table 1) or total soil (Table 4), and groundwater (Table 8), assuming exposure to either soil horizon simultaneously with groundwater. No chemicals in surface or total soil were selected as COPCs for the groundskeeper. No chemicals in groundwater were selected as cancer-based COPCs for the groundskeeper; therefore, no ILCR was estimated. Acetone was selected as the only noncancer-based COPC in groundwater. The HI for acetone of 1.37E-1 falls below the threshold level of 1. This indicates that exposure to surface soil and groundwater, or total soil and groundwater, is unlikely to result in adverse effects for the groundskeeper.

Construction Worker. The construction worker was evaluated for exposure to total soil (Table 6) and groundwater (Table 9). No chemicals in total soil were selected as COPCs for the construction worker. No chemicals in groundwater were selected as cancer-based COPCs for the construction worker; therefore, no ILCR was estimated. Acetone was selected as the only noncancer-based COPC in groundwater. The HI for acetone of 1.37E-1 falls below the threshold level of 1. This indicates that exposure to total soil and groundwater is unlikely to result in adverse effects for the construction worker.

Resident. The on-site resident was included in the PRA for the additional information and perspective provided by evaluation of the most highly exposed receptor, although residential development is not included in the plans for this site. Should the residential scenario "pass" the PRA, the site can be released for unrestricted use with no further action. The resident was evaluated for exposure surface soil (Table 3) or total soil (Table 7) and groundwater (Table 10), assuming exposure to either soil horizon simultaneously with groundwater. Cancer-based COPCs were selected only for surface and total soil. The total ILCR for surface or total soil of 5.39E-6 falls within the risk management range. It is concluded that the cancer risk for on-site residential exposure to surface or total soil and groundwater falls within but does not exceed the risk-management range. Acetone was selected as the only noncancer-based COPC in groundwater. The HI for acetone of 8.96E-1 falls below the threshold level of 1. This indicates that exposure to surface soil and groundwater, or total soil and groundwater, is unlikely to result in adverse effects for the resident.

Summary and Conclusions

In summary, 4 surface soil samples (and 3 depositional soil samples), 4 subsurface soil samples and 4 groundwater samples were analyzed for metals, SVOCs, VOCs and CWMs. All metals in all media were shown to be present at concentrations comparable to background. A groundskeeper, construction worker and on-site resident were evaluated for exposure to soil and groundwater. An ILCR was estimated only for residential exposure to soil. The total ILCR fell within the risk management range, and it is concluded that cancer risks for all receptors would not exceed the risk management range. All total HI estimates for all receptors fell below the threshold level of 1, indicating that adverse noncancer effects are unlikely. All metal and VOC concentrations in groundwater fell below their MCLs. It is concluded that Parcel 517(7) can be released for unrestricted use with no further action.

References

IT Corporation (IT), 2000, ***Human Health and Ecological Screening Values and PAH Background Summary Report***, Final, Fort McClellan, Calhoun County, Alabama, Prepared for U.S. Army Corps of Engineers, Mobile District, August.

IT Corporation (IT), 2002, ***Installation-Wide Work Plan***, Revision 2, Draft, Fort McClellan, Calhoun County, Alabama, Prepared for U.S. Army Corps of Engineers, Mobile District, February.

Shaw E&I, 2003, ***Selecting Site-Related Chemicals for Human Health and Ecological Risk Assessments for FTMC: Revision 2***, Memorandum from P.F. Goetchius to Fort McClellan (FTMC) Risk Assessment File, 24 June.

U.S. Environmental Protection Agency (EPA), 1989, ***Risk Assessment Guidance for Superfund Volume I Human Health Evaluation Manual (Part A)***, Interim Final, Office of Emergency and Remedial Response, Washington, DC, EPA/540/1-89/002, December.

U.S. Environmental Protection Agency (EPA), 1990, "National Oil and Hazardous Substances Pollution Contingency Plan," ***Federal Register*** 55(46): 8666-8865.

U.S. Environmental Protection Agency (EPA), 2002a, ***Region 4 Human Health Risk Assessment Bulletins – Supplement to RAGS, Interim Human Health Risk Assessment Bulletins***, Waste Management Division, EPA Region 4, Atlanta, GA, on line.

U.S. Environmental Protection Agency (EPA), 2002b, ***2002 Edition of the Drinking Water Standards and Health Advisories***, Office of Water, Washington, DC, EPA 822-R-02-038, Summer.

Table 1

Preliminary Risk Assessment for the Groundskeeper Exposure to Surface Soil
Chemical, Biological and Radiological Profiency Area, Parcel 517(7)
Fort McClellan, Calhoun County, Alabama

Chemical	MDC	Site-Related Chemical?[a]	Groundskeeper Soil SSSL-c[b]	Groundskeeper Soil SSSL-n[c]	Groundskeeper Cancer COPC?[d]	Groundskeeper Noncancer COPC?[e]	Groundskeeper ILCR[f]	Groundskeeper HI[g]
METALS								
Aluminum	2.22E+04	No (3)	NA	6.69E+03				
Arsenic	6.68E+00	No (1)	1.59E+00	3.06E+01				
Barium	8.35E+01	No (1)	NA	6.50E+02				
Beryllium	7.91E-01	No (1)	1.70E+01	2.39E+01				
Calcium	1.25E+04	No (3)	NA	NA				
Chromium[h]	2.06E+01	No (1)	3.41E+00	9.96E+01				
Cobalt	6.20E+00	No (1)	NA	2.90E+01				
Copper	3.51E+01	No (3)	NA	4.08E+03				
Iron	3.18E+04	No (1)	NA	3.06E+04				
Lead	4.40E+01	No (3)	NA	8.80E+02				
Magnesium	6.57E+03	No (3)	NA	NA				
Manganese	7.66E+02	No (1)	NA	7.05E+01				
Mercury	8.65E-02	No (2)	NA	2.85E+01				
Nickel	1.33E+01	No (3)	1.70E+02	2.02E+03				
Potassium	1.76E+03	No (3)	NA	NA				
Selenium	7.57E-01	No (3)	NA	5.11E+02				
Sodium	7.56E+01	No (1)	NA	NA				
Vanadium	4.56E+01	No (1)	NA	6.97E+02				
Zinc	9.23E+01	No (3)	NA	3.06E+04				
VOLATILE ORGANIC COMPOUNDS								
2-Butanone	2.20E-02	2.20E-02	NA	5.86E+04				
Acetone	2.40E-01	2.40E-01	NA	1.02E+04				
Toluene	1.40E-02	1.40E-02	NA	1.96E+04				
p-Cymene	1.10E-02	1.10E-02	NA	2.03E+04				
SEMIVOLATILE ORGANIC COMPOUNDS								
Anthracene	2.40E-01	No (4)	NA	3.04E+04				
Benzo(a)anthracene	1.50E+00	1.50E+00	3.85E+00	NA				
Benzo(a)pyrene	1.40E+00	No (4)	3.85E-01	NA				
Benzo(b)fluoranthene	2.10E+00	2.10E+00	3.85E+00	NA				
Benzo(ghi)perylene	8.60E-01	No (4)	NA	3.03E+03				
Benzo(k)fluoranthene	8.00E-01	No (4)	3.85E+01	NA				
Carbazole	2.20E-01	2.20E-01	1.42E+02	NA				
Chrysene	1.70E+00	1.70E+00	3.86E+02	NA				
Dibenz(a,h)anthracene	2.70E-01	No (4)	3.86E-01	NA				
Fluoranthene	3.30E+00	3.30E+00	NA	4.05E+03				
Indeno(1,2,3-cd)pyrene	9.90E-01	9.90E-01	3.85E+00	NA				

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Chemical	MDC	Site-Related Chemical?[a]	Groundskeeper Soil SSSL-c[b]	Groundskeeper Soil SSSL-n[c]	Groundskeeper Cancer COPC?[d]	Groundskeeper Noncancer COPC?[e]	Groundskeeper ILCR[f]	Groundskeeper HI[g]
Phenanthrene	1.20E+00	1.20E+00	NA	3.03E+04				
Pyrene	2.50E+00	2.50E+00	NA	3.05E+03				
bis(2-Ethylhexyl)phthalate	2.40E-01	2.40E-01	2.00E+02	2.04E+03				
CWM BREAKDOWN								
Thiodiglycol	8.80E-03	8.80E-03	NA	3.57E+03				
Total ILCR, HI							--	--

All concentrations expressed as mg/kg.
MDC = maximum detected concentration; COPC = Chemical of Potential Concern; ILCR = Incremental Lifetime Cancer Risk; HI = Hazard Index
-- = Not Calculated
NA = Not Available
[a] MDC presented only for site-related chemicals.
No (1) = Deselected as a site-related chemical at Tier 1.
No (2) = Deselected as a site-related chemical at Tier 2.
No (3) = Deselected as a site-related chemical at Tier 3.
No (4) = Deselected as a site-related chemical - see Table 2.
[b] Site-specific screening level (SSSL) based on cancer risk for groundskeeper exposure to soil.
[c] Site-specific screening level based on noncancer hazard for groundskeeper exposure to soil.
[d] MDC presented only if it exceeds SSSL-c.
[e] MDC presented only if it exceeds SSSL-n.
[f] Incremental lifetime cancer risk for groundskeeper exposed to chemical in surface soil.
[g] Hazard index for noncancer effects for groundskeeper exposed to chemical in surface soil.
[h] SSSL based on chromium VI.

Table 2

Polynuclear Aromatic Hydrocarbons (PAHs): Summary of Surface Soil Site-to-Background Evaluation
Chemical, Biological and Radiological (CBR) Proficiency Area, Parcel 517(7)
Fort McClellan, Calhoun County, Alabama

Chemical	MDC	BSC	Site-Related Chemical?[a]
SEMIVOLATILE ORGANIC COMPOUNDS			
Anthracene	2.40E-01	9.35E-01	
Benzo(a)anthracene	1.50E+00	1.19E+00	1.50E+00
Benzo(a)pyrene	1.40E+00	1.42E+00	
Benzo(b)fluoranthene	2.10E+00	1.66E+00	2.10E+00
Benzo(ghi)perylene	8.60E-01	9.55E-01	
Benzo(k)fluoranthene	8.00E-01	1.45E+00	
Carbazole	2.20E-01	NA	2.20E-01
Chrysene	1.70E+00	1.40E+00	1.70E+00
Dibenz(a,h)anthracene	2.70E-01	7.20E-01	
Fluoranthene	3.30E+00	2.03E+00	3.30E+00
Indeno(1,2,3-cd)pyrene	9.90E-01	9.37E-01	9.90E-01
Phenanthrene	1.20E+00	1.08E+00	1.20E+00
Pyrene	2.50E+00	1.63E+00	2.50E+00

All concentrations expressed as mg/kg.
MDC = maximum detected concentration; BSC = background screening criterion
NA = Not Available
[a] MDC presented only if it exceeds BSC, or no BSC is available.

Table 3

Preliminary Risk Assessment for the Resident Exposure to Surface Soil
Chemical, Biological and Radiological (CBR) Proficiency Area, Parcel 517(7)
Fort McClellan, Calhoun County, Alabama

Chemical	MDC	Site-Related Chemical?[a]	Resident Soil SSSL-c[b]	Resident Soil SSSL-n[c]	Resident Cancer COPC?[d]	Resident Noncancer COPC?[e]	Resident ILCR[f]	Resident HI[g]
METALS								
Aluminum	2.22E+04	No (3)	NA	7.80E+03				
Arsenic	6.68E+00	No (1)	4.26E-01	2.34E+00				
Barium	8.35E+01	No (1)	NA	5.47E+02				
Beryllium	7.91E-01	No (1)	NA	9.60E+00				
Calcium	1.25E+04	No (3)	NA	NA				
Chromium[h]	2.06E+01	No (1)	NA	2.32E+01				
Cobalt	6.20E+00	No (1)	NA	4.68E+02				
Copper	3.51E+01	No (3)	NA	3.13E+02				
Iron	3.18E+04	No (1)	NA	2.34E+03				
Lead	4.40E+01	No (3)	NA	4.00E+02				
Magnesium	6.57E+03	No (3)	NA	NA				
Manganese	7.66E+02	No (1)	NA	3.63E+02				
Mercury	8.65E-02	No (2)	NA	2.33E+00				
Nickel	1.33E+01	No (3)	NA	1.54E+02				
Potassium	1.76E+03	No (3)	NA	NA				
Selenium	7.57E-01	No (3)	NA	3.91E+01				
Sodium	7.56E+01	No (1)	NA	NA				
Vanadium	4.56E+01	No (1)	NA	5.31E+01				
Zinc	9.23E+01	No (3)	NA	2.34E+03				
VOLATILE ORGANIC COMPOUNDS								
2-Butanone	2.20E-02	2.20E-02	NA	4.66E+03				
Acetone	2.40E-01	2.40E-01	NA	7.76E+02				
Toluene	1.40E-02	1.40E-02	NA	1.55E+03				
p-Cymene	1.10E-02	1.10E-02	NA	1.55E+03				
SEMIVOLATILE ORGANIC COMPOUNDS								
Anthracene	2.40E-01	No (4)	NA	2.33E+03				
Benzo(a)anthracene	1.50E+00	1.50E+00	8.51E-01	NA	1.50E+00		1.76E-06	
Benzo(a)pyrene	1.40E+00	No (4)	8.51E-02	NA				
Benzo(b)fluoranthene	2.10E+00	2.10E+00	8.51E-01	NA	2.10E+00		2.47E-06	
Benzo(ghi)perylene	8.60E-01	No (4)	NA	2.32E+02				
Benzo(k)fluoranthene	8.00E-01	No (4)	8.51E+00	NA				
Carbazole	2.20E-01	2.20E-01	3.11E+01	NA				
Chrysene	1.70E+00	1.70E+00	8.61E+01	NA				
Dibenz(a,h)anthracene	2.70E-01	No (4)	8.61E-02	NA				

Table 3

Preliminary Risk Assessment for the Resident Exposure to Surface Soil
Chemical, Biological and Radiological (CBR) Proficiency Area, Parcel 517(7)
Fort McClellan, Calhoun County, Alabama

Chemical	MDC	Site-Related Chemical?[a]	Resident Soil SSSL-c[b]	Resident Soil SSSL-n[c]	Resident Cancer COPC?[d]	Resident Noncancer COPC?[e]	Resident ILCR[f]	Resident HI[g]
Fluoranthene	3.30E+00	3.30E+00	NA	3.09E+02				
Indeno(1,2,3-cd)pyrene	9.90E-01	9.90E-01	8.51E-01	NA	9.90E-01		1.16E-06	
Phenanthrene	1.20E+00	1.20E+00	NA	2.32E+03				
Pyrene	2.50E+00	2.50E+00	NA	2.33E+02				
bis(2-Ethylhexyl)phthalate	2.40E-01	2.40E-01	4.52E+01	1.56E+02				
CWM BREAKDOWN								
Thiodiglycol	8.80E-03	8.80E-03	NA	3.11E+02				
Total ILCR, HI							**5.39E-06**	**--**

All concentrations expressed as mg/kg.
MDC = maximum detected concentration; COPC = Chemical of Potential Concern; ILCR = Incremental Lifetime Cancer Risk; HI = Hazard Index
-- = Not Calculated
NA = Not Available

[a] MDC presented only for site-related chemicals.
No (1) = Deselected as a site-related chemical at Tier 1.
No (2) = Deselected as a site-related chemical at Tier 2.
No (3) = Deselected as a site-related chemical at Tier 3.
No (4) = Deselected as a site-related chemical - see Table 2.

[b] Site-specific screening level (SSSL) based on cancer risk for resident exposure to soil.

[c] Site-specific screening level based on noncancer hazard for resident exposure to soil.

[d] MDC presented only if it exceeds SSSL-c.

[e] MDC presented only if it exceeds SSSL-n.

[f] Incremental lifetime cancer risk for resident exposed to chemical in surface soil.

[g] Hazard index for noncancer effects for resident exposed to chemical in surface soil.

[h] SSSL based on chromium VI.

Table 4

Preliminary Risk Assessment for the Groundskeeper Exposure to Total Soil
Chemical, Biological and Radiological (CBR) Proficiency Area, Parcel 517(7)
Fort McClellan, Calhoun County, Alabama

Chemical	MDC	Site-Related Chemical?[a]	Groundskeeper Soil SSSL-c[b]	Groundskeeper Soil SSSL-n[c]	Groundskeeper Cancer COPC?[d]	Groundskeeper Noncancer COPC?[e]	Groundskeeper ILCR[f]	Groundskeeper HI[g]
METALS								
Aluminum	3.00E+04	No (3)	NA	6.69E+03				
Arsenic	9.48E+00	No (1)	1.59E+00	3.06E+01				
Barium	2.86E+02	No (3)	NA	6.50E+02				
Beryllium	1.55E+00	No (3)	1.70E+01	2.39E+01				
Calcium	1.25E+04	No (3)	NA	NA				
Chromium[h]	3.72E+01	No (1)	3.41E+00	9.96E+01				
Cobalt	2.34E+01	No (2)	NA	2.90E+01				
Copper	5.07E+01	No (3)	NA	4.08E+03				
Iron	4.95E+04	No (2)	NA	3.06E+04				
Lead	4.76E+01	No (3)	NA	8.80E+02				
Magnesium	6.57E+03	No (3)	NA	NA				
Manganese	7.66E+02	No (1)	NA	7.05E+01				
Mercury	8.65E-02	No (3)	NA	2.85E+01				
Nickel	3.89E+01	No (3)	1.70E+02	2.02E+03				
Potassium	2.23E+03	No (3)	NA	NA				
Selenium	7.57E-01	No (3)	NA	5.11E+02				
Silver	1.57E+00	No (3)	NA	5.11E+02				
Sodium	9.49E+01	No (1)	NA	NA				
Vanadium	6.69E+01	No (2)	NA	6.97E+02				
Zinc	9.23E+01	No (3)	NA	3.06E+04				
VOLATILE ORGANIC COMPOUNDS								
2-Butanone	2.20E-02	2.20E-02	NA	5.86E+04				
Acetone	2.40E-01	2.40E-01	NA	1.02E+04				
Toluene	1.40E-02	1.40E-02	NA	1.96E+04				
p-Cymene	1.10E-02	1.10E-02	NA	2.03E+04				
SEMIVOLATILE ORGANIC COMPOUNDS								
Anthracene	2.40E-01	No (4)	NA	3.04E+04				
Benzo(a)anthracene	1.50E+00	1.50E+00	3.85E+00	NA				
Benzo(a)pyrene	1.40E+00	No (4)	3.85E-01	NA				
Benzo(b)fluoranthene	2.10E+00	2.10E+00	3.85E+00	NA				
Benzo(ghi)perylene	8.60E-01	No (4)	NA	3.03E+03				
Benzo(k)fluoranthene	8.00E-01	No (4)	3.85E+01	NA				
Carbazole	2.20E-01	2.20E-01	1.42E+02	NA				
Chrysene	1.70E+00	1.70E+00	3.86E+02	NA				
Dibenz(a,h)anthracene	2.70E-01	No (4)	3.86E-01	NA				
Fluoranthene	3.30E+00	3.30E+00	NA	4.05E+03				

Table 4

Preliminary Risk Assessment for the Groundskeeper Exposure to Total Soil
Chemical, Biological and Radiological (CBR) Proficiency Area, Parcel 517(7)
Fort McClellan, Calhoun County, Alabama

Chemical	MDC	Site-Related Chemical?[a]	Groundskeeper Soil SSSL-c[b]	Groundskeeper Soil SSSL-n[c]	Groundskeeper Cancer COPC?[d]	Groundskeeper Noncancer COPC?[e]	Groundskeeper ILCR[f]	Groundskeeper HI[g]
Indeno(1,2,3-cd)pyrene	9.90E-01	9.90E-01	3.85E+00	NA				
Phenanthrene	1.20E+00	1.20E+00	NA	3.03E+04				
Pyrene	2.50E+00	2.50E+00	NA	3.05E+03				
bis(2-Ethylhexyl)phthalate	2.40E-01	2.40E-01	2.00E+02	2.04E+03				
CWM BREAKDOWN								
Thiodiglycol	8.80E-03	8.80E-03	NA	3.57E+03				
Total ILCR, HI							--	--

All concentrations expressed as mg/kg.
MDC = maximum detected concentration; COPC = Chemical of Potential Concern; ILCR = Incremental Lifetime Cancer Risk; HI = Hazard Index
-- = Not Calculated
NA = Not Available

[a] MDC presented only for site-related chemicals.
No (1) = Deselected as a site-related chemical at Tier 1.
No (2) = Deselected as a site-related chemical at Tier 2.
No (3) = Deselected as a site-related chemical at Tier 3.
No (4) = Deselected as a site-related chemical - see Table 5.

[b] Site-specific screening level (SSSL) based on cancer risk for groundskeeper exposure to soil.

[c] Site-specific screening level based on noncancer hazard for groundskeeper exposure to soil.

[d] MDC presented only if it exceeds SSSL-c.

[e] MDC presented only if it exceeds SSSL-n.

[f] Incremental lifetime cancer risk for groundskeeper exposed to chemical in total soil.

[g] Hazard index for noncancer effects for groundskeeper exposed to chemical in total soil.

[h] SSSL based on chromium VI.

Table 5

Polynuclear Aromatic Hydrocarbons (PAHs): Summary of Total Soil Site-to-Background Evaluation
Chemical, Biological and Radiological (CBR) Proficiency Area, Parcel 517(7)
Fort McClellan, Calhoun County, Alabama

Chemical	MDC	BSC[a]	Site-Related Chemical?[b]
SEMIVOLATILE ORGANIC COMPOUNDS			
Anthracene	2.40E-01	9.35E-01	
Benzo(a)anthracene	1.50E+00	1.19E+00	1.50E+00
Benzo(a)pyrene	1.40E+00	1.42E+00	
Benzo(b)fluoranthene	2.10E+00	1.66E+00	2.10E+00
Benzo(ghi)perylene	8.60E-01	9.55E-01	
Benzo(k)fluoranthene	8.00E-01	1.45E+00	
Carbazole	2.20E-01	NA	2.20E-01
Chrysene	1.70E+00	1.40E+00	1.70E+00
Dibenz(a,h)anthracene	2.70E-01	7.20E-01	
Fluoranthene	3.30E+00	2.03E+00	3.30E+00
Indeno(1,2,3-cd)pyrene	9.90E-01	9.37E-01	9.90E-01
Phenanthrene	1.20E+00	1.08E+00	1.20E+00
Pyrene	2.50E+00	1.63E+00	2.50E+00

All concentrations expressed as mg/kg.
MDC = maximum detected concentration; BSC = background screening criterion
NA = Not Available
[a] BSC for surface soil used for total soil.
[b] MDC presented only if it exceeds BSC, or no BSC is available.

Table 6

Preliminary Risk Assessment for the Construction Worker Exposure to Total Soil Chemical, Biological and Radiological (CBR) Proficiency Area, Parcel 517(7) Fort McClellan, Calhoun County, Alabama

Chemical	MDC	Site-Related Chemical?[a]	Construction Worker Soil SSSL-c[b]	Construction Worker Soil SSSL-n[c]	Construction Worker Cancer COPC?[d]	Construction Worker Noncancer COPC?[e]	Construction Worker ILCR[f]	Construction Worker HI[g]
METALS								
Aluminum	3.00E+04	No (3)	NA	3.34E+03				
Arsenic	9.48E+00	No (1)	1.98E+01	1.53E+01				
Barium	2.86E+02	No (3)	NA	3.25E+02				
Beryllium	1.55E+00	No (3)	2.13E+02	9.60E+00				
Calcium	1.25E+04	No (3)	NA	NA				
Chromium[h]	3.72E+01	No (1)	4.26E+01	4.91E+01				
Cobalt	2.34E+01	No (2)	NA	1.45E+01				
Copper	5.07E+01	No (3)	NA	2.04E+03				
Iron	4.95E+04	No (2)	NA	1.53E+04				
Lead	4.76E+01	No (3)	NA	8.80E+02				
Magnesium	6.57E+03	No (3)	NA	NA				
Manganese	7.66E+02	No (1)	NA	3.52E+01				
Mercury	8.65E-02	No (3)	NA	1.38E+01				
Nickel	3.89E+01	No (3)	2.13E+03	9.59E+02				
Potassium	2.23E+03	No (3)	NA	NA				
Selenium	7.57E-01	No (3)	NA	2.55E+02				
Silver	1.57E+00	No (3)	NA	2.56E+02				
Sodium	9.49E+01	No (1)	NA	NA				
Vanadium	6.69E+01	No (2)	NA	3.16E+02				
Zinc	9.23E+01	No (3)	NA	1.52E+04				
VOLATILE ORGANIC COMPOUNDS								
2-Butanone	2.20E-02	2.20E-02	NA	2.86E+04				
Acetone	2.40E-01	2.40E-01	NA	4.95E+03				
Toluene	1.40E-02	1.40E-02	NA	9.62E+03				
p-Cymene	1.10E-02	1.10E-02	NA	9.93E+03				
SEMIVOLATILE ORGANIC COMPOUNDS								
Anthracene	2.40E-01	No (4)	NA	1.48E+04				
Benzo(a)anthracene	1.50E+00	1.50E+00	4.62E+01	NA				
Benzo(a)pyrene	1.40E+00	No (4)	4.62E+00	NA				
Benzo(b)fluoranthene	2.10E+00	2.10E+00	4.62E+01	NA				
Benzo(ghi)perylene	8.60E-01	No (4)	NA	1.46E+03				
Benzo(k)fluoranthene	8.00E-01	No (4)	4.62E+02	NA				
Carbazole	2.20E-01	2.20E-01	1.70E+03	NA				
Chrysene	1.70E+00	1.70E+00	4.71E+03	NA				
Dibenz(a,h)anthracene	2.70E-01	No (4)	4.71E+00	NA				

Table 6

Preliminary Risk Assessment for the Construction Worker Exposure to Total Soil Chemical, Biological and Radiological (CBR) Proficiency Area, Parcel 517(7) Fort McClellan, Calhoun County, Alabama

Chemical	MDC	Site-Related Chemical?[a]	Construction Worker Soil SSSL-c[b]	Construction Worker Soil SSSL-n[c]	Construction Worker Cancer COPC?[d]	Construction Worker Noncancer COPC?[e]	Construction Worker ILCR[f]	Construction Worker HI[g]
Fluoranthene	3.30E+00	3.30E+00	NA	1.94E+03				
Indeno(1,2,3-cd)pyrene	9.90E-01	9.90E-01	4.62E+01	NA				
Phenanthrene	1.20E+00	1.20E+00	NA	1.46E+04				
Pyrene	2.50E+00	2.50E+00	NA	1.48E+03				
bis(2-Ethylhexyl)phthalate	2.40E-01	2.40E-01	2.45E+03	1.00E+03				
CWM BREAKDOWN								
Thiodiglycol	8.80E-03	8.80E-03	NA	1.75E+03				
Total ILCR, HI							--	--

All concentrations expressed as mg/kg.
MDC = maximum detected concentration; COPC = Chemical of Potential Concern; ILCR = Incremental Lifetime Cancer Risk; HI = Hazard Index
-- = No ILCR or HI calculated
NA = Not Available
[a] MDC presented only for site-related chemicals.
No (1) = Deselected as a site-related chemical at Tier 1.
No (2) = Deselected as a site-related chemical at Tier 2.
No (3) = Deselected as a site-related chemical at Tier 3.
No (4) = Deselected as a site-related chemical - see Table 5.
[b] Site-specific screening level (SSSL) based on cancer risk for the construction worker exposure to soil.
[c] Site-specific screening level based on noncancer hazard for the construction worker exposure to soil.
[d] MDC presented only if it exceeds SSSL-c.
[e] MDC presented only if it exceeds SSSL-n.
[f] Incremental lifetime cancer risk for the construction worker exposed to chemical in total soil.
[g] Hazard index for noncancer effects for the construction worker exposed to chemical in total soil.
[h] SSSL based on chromium VI.

Table 7

Preliminary Risk Assessment for the Resident Exposure to Total Soil
Chemical, Biological and Radiological (CBR) Proficiency Area, Parcel 517(7)
Fort McClellan, Calhoun County, Alabama

Chemical	MDC	Site-Related Chemical?[a]	Resident Soil SSSL-c[b]	Resident Soil SSSL-n[c]	Resident Cancer COPC?[d]	Resident Noncancer COPC?[e]	Resident ILCR[f]	Resident HI[g]
METALS								
Aluminum	3.00E+04	No (3)	NA	7.80E+03				
Arsenic	9.48E+00	No (1)	4.26E-01	2.34E+00				
Barium	2.86E+02	No (3)	NA	5.47E+02				
Beryllium	1.55E+00	No (3)	NA	9.60E+00				
Calcium	1.25E+04	No (3)	NA	NA				
Chromium[h]	3.72E+01	No (1)	NA	2.32E+01				
Cobalt	2.34E+01	No (2)	NA	4.68E+02				
Copper	5.07E+01	No (3)	NA	3.13E+02				
Iron	4.95E+04	No (2)	NA	2.34E+03				
Lead	4.76E+01	No (3)	NA	4.00E+02				
Magnesium	6.57E+03	No (3)	NA	NA				
Manganese	7.66E+02	No (1)	NA	3.63E+02				
Mercury	8.65E-02	No (3)	NA	2.33E+00				
Nickel	3.89E+01	No (3)	NA	1.54E+02				
Potassium	2.23E+03	No (3)	NA	NA				
Selenium	7.57E-01	No (3)	NA	3.91E+01				
Silver	1.57E+00	No (3)	NA	3.91E+01				
Sodium	9.49E+01	No (1)	NA	NA				
Vanadium	6.69E+01	No (2)	NA	5.31E+01				
Zinc	9.23E+01	No (3)	NA	2.34E+03				
VOLATILE ORGANIC COMPOUNDS								
2-Butanone	2.20E-02	2.20E-02	NA	4.66E+03				
Acetone	2.40E-01	2.40E-01	NA	7.76E+02				
Toluene	1.40E-02	1.40E-02	NA	1.55E+03				
p-Cymene	1.10E-02	1.10E-02	NA	1.55E+03				
SEMIVOLATILE ORGANIC COMPOUNDS								
Anthracene	2.40E-01	No (4)	NA	2.33E+03				
Benzo(a)anthracene	1.50E+00	1.50E+00	8.51E-01	NA	1.50E+00		1.76E-06	
Benzo(a)pyrene	1.40E+00	No (4)	8.51E-02	NA				
Benzo(b)fluoranthene	2.10E+00	2.10E+00	8.51E-01	NA	2.10E+00		2.47E-06	
Benzo(ghi)perylene	8.60E-01	No (4)	NA	2.32E+02				
Benzo(k)fluoranthene	8.00E-01	No (4)	8.51E+00	NA				

Table 7

Preliminary Risk Assessment for the Resident Exposure to Total Soil
Chemical, Biological and Radiological (CBR) Proficiency Area, Parcel 517(7)
Fort McClellan, Calhoun County, Alabama

Chemical	MDC	Site-Related Chemical?[a]	Resident Soil SSSL-c[b]	Resident Soil SSSL-n[c]	Resident Cancer COPC?[d]	Resident Noncancer COPC?[e]	Resident ILCR[f]	Resident HI[g]
Carbazole	2.20E-01	2.20E-01	3.11E+01	NA				
Chrysene	1.70E+00	1.70E+00	8.61E+01	NA				
Dibenz(a,h)anthracene	2.70E-01	No (4)	8.61E-02	NA				
Fluoranthene	3.30E+00	3.30E+00	NA	3.09E+02				
Indeno(1,2,3-cd)pyrene	9.90E-01	9.90E-01	8.51E-01	NA	9.90E-01		1.16E-06	
Phenanthrene	1.20E+00	1.20E+00	NA	2.32E+03				
Pyrene	2.50E+00	2.50E+00	NA	2.33E+02				
bis(2-Ethylhexyl)phthalate	2.40E-01	2.40E-01	4.52E+01	1.56E+02				
CWM BREAKDOWN								
Thiodiglycol	8.80E-03	8.80E-03	NA	3.11E+02				
Total ILCR, HI							**5.39E-06**	--

All concentrations expressed as mg/kg.

[a] MDC presented only for site-related chemicals.

-- = No ILCR or HI calculated

NA = Not Available

[a] MDC presented only for site-related chemicals.

No (1) = Deselected as a site-related chemical at Tier 1.

No (2) = Deselected as a site-related chemical at Tier 2.

No (3) = Deselected as a site-related chemical at Tier 3.

No (4) = Deselected as a site-related chemical - see Table 5.

[b] Site-specific screening level (SSSL) based on cancer risk for the resident exposure to soil.

[c] Site-specific screening level based on noncancer hazard for the resident exposure to soil.

[d] MDC presented only if it exceeds SSSL-c.

[e] MDC presented only if it exceeds SSSL-n.

[f] Incremental lifetime cancer risk for the resident exposed to chemical in total soil.

[g] Hazard index for noncancer effects for the resident exposed to chemical in total soil.

[h] SSSL based on chromium VI.

Table 8

Preliminary Risk Assessment for the Groundskeeper Exposure to Groundwater
Chemical, Biological and Radiological (CBR) Proficiency Area, Parcel 517(7)
Fort McClellan, Calhoun County, Alabama

Chemical	MDC	Site-Related Chemical?[a]	MCL	Groundskeeper Groundwater SSSL-c[b]	Groundskeeper Groundwater SSSL-n[c]	Groundskeeper Cancer COPC?[d]	Groundskeeper Noncancer COPC?[e]	Groundskeeper ILCR[f]	Groundskeeper HI[g]
METALS									
Aluminum	7.31E-01	No (1)	NA	NA	1.01E+01				
Arsenic	4.87E-03	No (1)	1.00E-02	1.90E-04	3.05E-03				
Barium	5.34E-02	No (1)	2.00E+00	NA	7.12E-01				
Calcium	3.90E+01	No (1)	NA	NA	NA				
Cobalt	1.21E-02	No (1)	NA	NA	6.08E-01				
Iron	7.02E+00	No (1)	NA	NA	3.05E+00				
Magnesium	2.95E+01	No (3)	NA	NA	NA				
Manganese	3.43E+00	No (2)	NA	NA	4.44E-01				
Nickel	2.45E-02	No (2)	NA	NA	2.02E-01				
Potassium	4.77E+00	No (1)	NA	NA	NA				
VOLATILE ORGANIC COMPOUNDS									
Acetone	1.40E+00	1.40E+00	NA	NA	1.02E+00		1.40E+00		1.37E-01
Methylene chloride	4.10E-04	4.10E-04	5.00E-03	3.75E-02	6.02E-01				
Total ILCR, HI								--	**1.37E-01**

All concentrations expressed as mg/L.
MDC = maximum detected concentration; COPC = Chemical of Potential Concern; ILCR = Incremental Lifetime Cancer Risk; HI = Hazard Index
MCL = maximum contaminant level from U.S. Environmental Protection Agency (EPA), 2002, ***2002 Edition of the Drinking Water Standards and Health Advisories***, Office of Water, Washington, DC, EPA 822-R-02-038.
-- = No ILCR or HI calculated
NA = Not Available

[a] MDC presented only for site-related chemicals.
No (1) = Deselected as a site-related chemical at Tier 1.
No (2) = Deselected as a site-related chemical at Tier 2.
No (3) = Deselected as a site-related chemical at Tier 3.

[b] Site-specific screening level (SSSL) based on cancer risk for the groundskeeper exposure to groundwater.

[c] Site-specific screening level based on noncancer hazard for the groundskeeper exposure to groundwater.

[d] MDC presented only if it exceeds SSSL-c.

[e] MDC presented only if it exceeds SSSL-n.

[f] Incremental lifetime cancer risk for the groundskeeper exposed to chemical in groundwater.

[g] Hazard index for noncancer effects for the groundskeeper exposed to chemical in groundwater.

Table 9

Preliminary Risk Assessment for the Construction Worker Exposure to Groundwater
Chemical, Biological and Radiological (CBR) Proficiency Area, Parcel 517(7)
Fort McClellan, Calhoun County, Alabama

Chemical	MDC	Site-Related Chemical?[a]	MCL	Construction Worker GW SSSL-c[b]	Construction Worker GW SSSL-n[c]	Construction Worker COPC?[d]	Construction Worker COPC?[e]	Construction Worker ILCR[f]	Construction Worker HI[g]
METALS									
Aluminum	7.31E-01	No (1)	NA	NA	1.01E+01				
Arsenic	4.87E-03	No (1)	1.00E-02	4.75E-03	3.05E-03				
Barium	5.34E-02	No (1)	2.00E+00	NA	7.12E-01				
Calcium	3.90E+01	No (1)	NA	NA	NA				
Cobalt	1.21E-02	No (1)	NA	NA	6.08E-01				
Iron	7.02E+00	No (1)	NA	NA	3.05E+00				
Magnesium	2.95E+01	No (3)	NA	NA	NA				
Manganese	3.43E+00	No (2)	NA	NA	4.44E-01				
Nickel	2.45E-02	No (2)	NA	NA	2.02E-01				
Potassium	4.77E+00	No (1)	NA	NA	NA				
VOLATILE ORGANIC COMPOUNDS									
Acetone	1.40E+00	1.40E+00	NA	NA	1.02E+00		1.40E+00		1.37E-01
Methylene chloride	4.10E-04	4.10E-04	5.00E-03	9.37E-01	6.02E-01				
Total ILCR, HI								--	**1.37E-01**

All concentrations expressed as mg/L.
MDC = maximum detected concentration; COPC = Chemical of Potential Concern; ILCR = Incremental Lifetime Cancer Risk; HI = Hazard Index
MCL = maximum contaminant level from U.S. Environmental Protection Agency (EPA), 2002, ***2002 Edition of the Drinking Water Standards and Health Advisories***, Office of Water, Washington, DC, EPA 822-R-02-038.
-- = No ILCR or HI calculated
NA = Not Available

[a] MDC presented only for site-related chemicals.
No (1) = Deselected as a site-related chemical at Tier 1.
No (2) = Deselected as a site-related chemical at Tier 2.
No (3) = Deselected as a site-related chemical at Tier 3.

[b] Site-specific screening level (SSSL) based on cancer risk for the construction worker exposure to groundwater.

[c] Site-specific screening level based on noncancer hazard for the construction worker exposure to groundwater.

[d] MDC presented only if it exceeds SSSL-c.

[e] MDC presented only if it exceeds SSSL-n.

[f] Incremental lifetime cancer risk for the construction worker exposed to chemical in groundwater.

[g] Hazard index for noncancer effects for the construction worker exposed to chemical in groundwater.

Table 10

Preliminary Risk Assessment for the Resident Exposure to Groundwater
Chemical, Biological and Radiological (CBR) Proficiency Area, Parcel 517(7)
Fort McClellan, Calhoun County, Alabama

Chemical	MDC	Site-Related Chemical?[a]	MCL	Resident Groundwater SSSL-c[b]	Resident Groundwater SSSL-n[c]	Resident COPC?[d]	Resident COPC?[e]	Resident ILCR[f]	Resident HI[g]
METALS									
Aluminum	7.31E-01	No (1)	NA	NA	1.56E+00				
Arsenic	4.87E-03	No (1)	1.00E-02	4.46E-05	4.69E-04				
Barium	5.34E-02	No (1)	2.00E+00	NA	1.10E-01				
Calcium	3.90E+01	No (1)	NA	NA	NA				
Cobalt	1.21E-02	No (1)	NA	NA	9.39E-02				
Iron	7.02E+00	No (1)	NA	NA	4.69E-01				
Magnesium	2.95E+01	No (3)	NA	NA	NA				
Manganese	3.43E+00	No (2)	NA	NA	7.35E-02				
Nickel	2.45E-02	No (2)	NA	NA	3.13E-02				
Potassium	4.77E+00	No (1)	NA	NA	NA				
VOLATILE ORGANIC COMPOUNDS									
Acetone	1.40E+00	1.40E+00	NA	NA	1.56E-01		1.40E+00		8.96E-01
Methylene chloride	4.10E-04	4.10E-04	5.00E-03	7.85E-03	9.32E-02				
Total ILCR, HI								--	**8.96E-01**

All concentrations expressed as mg/L.
MDC = maximum detected concentration; COPC = Chemical of Potential Concern; ILCR = Incremental Lifetime Cancer Risk; HI = Hazard Index
MCL = maximum contaminant level from U.S. Environmental Protection Agency (EPA), 2002, ***2002 Edition of the Drinking Water Standards and Health Advisories***, Office of Water, Washington, DC, EPA 822-R-02-038.
-- = No ILCR or HI calculated
NA = Not Available

[a] MDC presented only for site-related chemicals.
No (1) = Deselected as a site-related chemical at Tier 1.
No (2) = Deselected as a site-related chemical at Tier 2.
No (3) = Deselected as a site-related chemical at Tier 3.

[b] Site-specific screening level (SSSL) based on cancer risk for the resident exposure to groundwater.

[c] Site-specific screening level based on noncancer hazard for the resident exposure to groundwater.

[d] MDC presented only if it exceeds SSSL-c.

[e] MDC presented only if it exceeds SSSL-n.

[f] Incremental lifetime cancer risk for the resident exposed to chemical in groundwater.

[g] Hazard index for noncancer effects for the resident exposed to chemical in groundwater.

Response to Alabama Department of Environmental Management Comments on the Draft-Final Site Investigation Report CBR Proficiency Area, Parcel 517(7) (dated August 2002) Fort McClellan, Calhoun County, Alabama

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Comments from Wm. Gerald Hardy, Chief, Land Division, dated January 2, 2003.

Comment 1: **The Alabama Department of Environmental Management (ADEM or the Department) and the Environmental Protection Agency (EPA) have reviewed Fort McClellan's submittal of the *Final Site Investigation Report for the CBR Proficiency Area, Parcel 517(7).* During the Base Realignment and Closure Team (BCT) meeting on April 16, 2002, the Department presented comments on the report to the Army and BCT stakeholders in order to resolve the Department's comments. The Army recommended a No Further Action (NFA) and unrestricted land reuse designation for Parcel 517(7).**

Based on Fort McClellan's analytical data, the Department concurs that the limited number of exceedances of various contaminant levels in site media are of insufficient magnitude to pose a potential threat to human and ecological receptors at Parcel 517(7). Although anthropogenic compounds were present at levels significantly higher than ecological screening values (ESVs), there are no relevant ecological receptors on the site and the area is primarily paved. Therefore, ADEM concurs that ecological concerns are not relevant to this parcel.

The Department concurs with Fort McClellan's recommendation that Parcel 517(7) be designated as No Further Action and unrestricted reuse.

Response 1: Comment noted.

Response to U.S. Environmental Protection Agency Comments on the Draft-Final Site Investigation Report for the CBR Proficiency Area, Parcel 517(7) Fort McClellan, Calhoun County, Alabama

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Comments from Doyle T. Brittain, Senior Remedial Project Manager, dated October 11, 2002.

General Comment

Comment 1: **Several constituents were eliminated as either human and/or ecological COPCs based on comparison to the range of background concentrations detected for each specific constituent. The only appropriate comparison using background should be comparison of the maximum concentration of the constituent to 2 times the mean background concentration. Therefore, all constituents eliminated as COPCs based on comparison to the background range should be re-included as COPCs.**

Response 1: Site metals data were re-evaluated in accordance with a new background screening protocol agreed to by the BCT in March 2003. The three-tiered process consists of statistical testing and geochemical evaluation to select site-related metals. The background screening methodology is described in the technical memorandum "Selecting Site-Related Chemicals for Human Health and Ecological Risk Assessments for FTMC: Revision 2," (Shaw Environmental, Inc., 2003).

Specific Comments

Comment 1: **Page ES-2 and Elsewhere. The statement is made that *IT recommends "No Further Action" and unrestricted land reuse with regard to hazardous, toxic, and radioactive waste at the CBR Proficiency Area, Parcel 517(7).* This statement should be changed to reflect contaminants specifically addressed in the subject report.**

Response 1: Agree. The text will be revised to indicate "...with regard to CERCLA-related hazardous substances..."

Comment 2: **Figure 1-2. The surface water flow direction should be shown on this figure and on Figure 3-1.**

Response 2: The flow directions for the natural surface water features (i.e., South Branch of Cane Creek and its tributary) *are* shown on the figures. However, the figures will be revised to show the flow directions for the man-made surface drainages.

Comment 3: **Page 5-2, Line 2. This line states that aluminum concentrations were within the range of background values determined by SAIC. While the range of**

background concentrations should be discussed, the range of background should not be used as a method to eliminate aluminum as a COPC. Therefore, aluminum should be considered as a COPC for this site and carried forward in the Human Health Risk Assessment (HHRA) process.

Response 3: See response to General Comment No. 1.

Comment 4: **Page 5-2, Line 6. The text states that aluminum and zinc concentrations were within the range of background values determined by SAIC. While the range of background concentrations should be discussed, the range of background should not be used as additional lines of evidence for elimination of aluminum and zinc as a COPC, at this step of the ERA. Therefore, aluminum and zinc should be considered as a COPC for this site and carried forward to Step 3 of the Ecological Risk Assessment (ERA) process.**

Response 4: See response to General Comment No. 1.

Comment 5: **Page 5-3, Line 11. The text states that metals were within the range of background values except for aluminum and iron. Any metal eliminated as a COPC based on comparison to the range of background should be re-included as a COPC if its maximum concentration exceeded 2 times the mean background concentration of that constituent.**

Response 5: See response to General Comment No. 1.

Comment 6: **Page 5-4, Line 3. It is stated that magnesium results were within the range of background values determined by SAIC. Any magnesium values eliminated should be re-included as a COPC if its maximum concentration exceeded 2 times the mean background concentration of that constituent.**

Response 6: See response to General Comment No. 1.

Comment 7: **Appendix I. Pages 4 and 5 state that comparison of the maximum detected concentration (MDC) of certain constituents were below their respective Upper Tolerance Levels (UTL). The use of UTLs in the PRA is not conservative in nature and is inappropriate for inclusion in the Site Investigation. Use of UTLs are appropriate for consideration in either the full HHRA or ERA as additional lines of evidence but not as the sole reason a constituent is eliminated as a COPC. Appendix I should be re-written to focus on comparison of a constituent's maximum concentration to 2 times its respective background average.**

Response 7: The PRA was revised to incorporate the results of the new background screening protocol. See response to General Comment No. 1.